इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 5301 (1987): Sodium chlorate [CHD 1: Inorganic Chemicals]

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS : 5301 - 1987

Indian Standard
SPECIFICATION FOR SODIUM CHLORATE
(First Revision)

UDC 661.833.322.5

© *Copyright* 1987

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BHADUR SHAH ZAFAR M4RG
NEW DELHI 110002

Gr 4 ***December* 1987**

AMENDMENT NO. 2 JULY 2008
TO
IS 5301 : 1987 SPECIFICATION FOR
SODIUM CHLORATE

(First Revision)

(*Page 6, Appendix* A) — Substitute the following for the existing

A-2 SODIUM CHLORATE

A-2.0 Outline of the Method — Sodium chlorate is determined by estimating the amount of standardized ferrous ammonium sulphate consumed by the material after reduction

A-2.1 Reagents

A-2.1.1 *0 1 N Potassium Dichromate Solution* — Dry Potassium Dichromate (AR grade) at 140°-150°C for 30-60 mm and cool in a closed vessel in a desiccator. Dissolve 4.904 g in water and dilute in a volumetric flask to 1 000 ml.

A-2.1.2 *0 2 N Ferrous Ammonium Sulphate Solution in 4 N Sulphuric Acid* — Dissolve 78.4 g of ferrous ammonium sulphate (AR grade) ($FeSO_4(NH_4)_2$ SO_4 $6H_2O$, M wt-392) in 1 000 ml of 4 N sulphuric acid.

A-2.1.3 *1 1 Ortho Phosphoric Acid Solution* — Take 100 ml of ortho phosphoric acid and dilute with 100 ml of water.

A-2.1.4 *Sodium Diphenyl Amine Sulphonate Indicator (0 2%)* — Dissolve 0.20 g of sodium diphenyl amine sulphonate in 100 ml of distilled water.

A-2.2 Procedure — Dry the material over sulphuric acid for 24 h Weigh accurately about 2 13 g (M) of sodium chlorate Dissolve it in approximately 100 ml of water in a volumetric flask and make up the volume to one litre (0 02M) In a 250-ml conical flask, place 25 ml of above sodium chlorate solution, 25 ml of 0 2 N ferrous ammonium sulphate solution in 4 N sulphuric acid and add cautiously 12 ml of concentrated sulphuric acid. Heat the mixture to boiling (in order to ensure completion of reduction) and cool to room temperature by placing the flask under running tap water. Add 20 ml of 1:1 ortho phosphoric acid followed by 0.5 ml of sodium diphenyl amine sulphonate indicator Titrate the excess of ferrous ion with standard 0 1 N potassium dichromate solution to a first tinge of purple coloration, which remain on stirring Let the reading be V_1

Perform blank titration with the ferrous ammonium sulphate solution by repeating the procedure but using 25 ml of distilled water in place of sodium chlorate solution Let the reading be V_2 (Blank) The difference in reading is equivalent to the amount of sodium chlorate added.

A-2.3 Calculation

$$\text{Sodium chlorate, percent by mass} = \frac{(V_2 - V_1) \times N \times 70.96}{M}$$

where

N = normality of potassium dichromate solution used for titration,

M = mass of sodium chlorate sample in g dissolved per litre of solution,

V_2 = volume in ml of potassium dichromate solution consumed in blank experiment, and

V_1 = volume in ml of potassium dichromate solution consumed by excess of reducing agent

(CHD 01)

Reprography Unit, BIS, New Delhi, India

AMENDMENT NO. 1 FEBRUARY 1995
TO
IS 5301 : 1987 SPECIFICATION FOR SODIUM CHLORATE

(First Revision)

[*Page* 4, *Table* 1, *Sl No.* (i), *col* 2] — Substitute '$NaClO_3$' *for* '$NaClO_2$'.

[*Page* 4, *Table* 1, *Sl No.* (ix), *col* 3] — Substitute '0.02' *for* '0.05'.

[*Page* 4, *Table* 1, *Sl No.* (ix), *col* 4] — Substitute '0.5' *for* '0.02'.

[*Page* 4, *Table* 1, *Sl No.* (x), *col* 2] — Substitute '(As_2O_3)' *for* '(As_2O_2)'.

(*Page* 7, *clause* **A-3.1**, *line* 4) — Add 'for 2 h' after '105°C ± 2°C'.

(*Page* 8, *clause* **A-4.3**, *line* 5) — Substitute '10 ml' *for* '1 ml'.

(*Page* 13, *clause* **A-10.2.1**, *line* 2) — Substitute '0.002' *for* '0.005'.

(*Page* 13, *clause* **A-10.2.1**, *line* 3) — Substitute '0.005' *for* '0.002'.

(CHD 002)

Reprography Unit, BIS, New Delhi, India

IS : 5301 - 1987

Indian Standard

SPECIFICATION FOR SODIUM CHLORATE

(*First Revision*)

Acids, Alkalis and Halides Sectional Committee, CDC 56

Chairman	*Representing*
PROF M. M TAQUI KHAN	Central Salt & Marine Chemicals Research Institute (CSIR), Bhavnagar
Members	
DR M. C. VAIDYA (*Alternate* to Prof M M Taqur Khan)	
SHRI B K. AHAND	Punjab National Fertilizers & Chemicals Ltd, Chandigarh
SHRI L. N. SINGH (*Alternate)*	
SHRI M. L. BHAMBANI	National Test House, Calcutta
SHRI T. K. DUTTA (*Alternate)*	
SHRI R. C. BHATTACHARYA	Directorate General of Technical Development, New Delhi
DR V. V BHUJLE	Standard Alkali (Chemicals Division), Bombay
SHRI A S. KULKARNI (*Alternate)*	
SHRI R. N. CHOKSHI	Gujarat State Fertilizers Co Ltd, Vadodara
SHRI N. A. PATEL (*Alternate)*	
SHRI M V DESAI	Atul Products Ltd, Atul
DR J. M. TUREL (*Alternate*)	
SHRI G. R. DUBEY	Gwalior Rayon Silk Manufacturing (Wvg) Co Ltd, Nagda
SHRI B. L. GUPTA	Kothari Industrial Corporation Ltd, Madras
DR H V. R IENGAR	E.I.D -Parry (India) Ltd, Madras
DR V. C NAIR (*Alternate*)	
SHRI V. G. JOSHI	Hindustan Organic Chemicals Ltd, Rasayani
SHRI N. V. KAMBLE	Saurashtra Chemicals, Porbandar
SHRI L. K. MALAVIYA (*Alternate)*	
SHRI V. B. KHANNA	Directorate General of Supplies & Disposals, New Delhi
SHRI N. K. KANSAL (*Alternate)*	
SHRI MANMOHAN SINGH	Indian Paper Mills Association, Calcutta
SHRI N. K. GUPTA (*Alternate)*	

(*Continued on page* 2)

© *Copyright* 1987
BUREAU OF INDIAN STANDARDS
This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act

(*Continued from page* 1)

Members	*Representing*
SHRI V. K. M. MENON	Alkali Manufacturers Association of India, Bombay
SHRI H. K. DEDHIA (*Alternate*)	
DR B S. NAGAR	Indian Dyestuff Industries Ltd, Bombay
SHRI N. R. FADNIS (*Alternate*)	
DR V. N NIGAM	Ministry of Defence (DGI)
SHRI K. B DUTTA (*Alternate*)	
DR ANIL PANDIT	Deepak Nitrite Ltd, Vadodara
SHRI C. S NAGAR (*Alternate*)	
SHRI G. C. DUTTA ROY	Shriram Foods & Fertiliser Industries, New Delhi
SHRI S. K. NANDA (*Alternate*)	
SHRI P. Roy	Bengal Chemicals & Pharmaceuticals Ltd, Calcutta
SHRI R. K. CHATTERJEE (*Alternate*)	
SHRI N K SACHAR	Gujarat Alkalies & Chemicals Ltd, Vadodara
SHRI J. B. SHARMA (*Alternate*)	
SHRI C. P SARANATHAN	Mettur Chemical & Industrial Corporation Ltd, Mettur Dam
SHRI M. R. SOMAYAJI (*Alternate*)	
SHRI V S. SAXENA	Ballarpur Industries Ltd, New Delhi
SHRI J S TALWAR (*Alternate*)	
DR N SEN	Indian Soap & Toiletries Makers' Association, Bombay
DR N. N. SHARMA	Tata Chemicals Ltd, Bombay
SHRI K. H. PAREKH (*Alternate*)	
SHRI S K. SUBBAROYAN	Hindustan Lever Ltd, Bombay
DR A. N. BHAT (*Alternate*)	
SHRI P. SUBRAMANIAN	Salt Commissioner, Jaipur
SHRI E K SARMA (*Alternate*)	
DR M. S VAIDEV	Dharamsi Morarji Chemical Co Ltd, Bombay
DR K. M. VERMA	Projects & Development India Ltd, Sindri
SHRI SATISH CHANDER, Director (Chem)	Director General, BIS (*Ex-officio Member*)

Secretary

SHRI M. BAKSHI GUPTA
Deputy Director (Chem), BIS

Chlorine and Its Inorganic Products Subcommittee, CDC 56 : 3

Convener	
SHRI V. S. SAXENA	Ballarpur Industries Ltd, New Delhi
Members	
SHRI J. S. TALWAR (*Alternate* to Shri V. S. Saxena)	
SHRI R. C. BHATTACHARYA	Directorate General of Technical Development, New Delhi
SHRI KULTAR SINGH (*Alternate*)	
SHRI V. V. BHUJLE	Standard Alkali (Chemicals Division), Bombay
SHRI A. S. KOLKARNI (*Alternate*)	

(*Continued* on *page* 15)

Indian Standard

SPECIFICATION FOR SODIUM CHLORATE

(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 15 July 1987, after the draft finalized by the Acids, Alkalis and Halides Sectional Committee had been approved by the Chemical Division Council.

0.2 The main use of sodium chlorate, also known as chlorate of soda is in the bleaching of wood pulp, oils and fats and finds expensive use as an oxidizing agent; as a substitute for potassium chlorate, as a defohant, as a weed killer, in medicine, in manufacturing explosives, dyes and perchlorates; for recovery of bromine from natural brines, leather tanning and finishing; and as textile mordant.

0.3 The standard was first issued in 1969. Because of its hygroscopic nature, sodium chlorate is rarely used as analytical reagent or as a standard; as such the application of this chemical as analytical reagent has been deleted and the two grades now being covered in the standard are pure and technical. Keeping in view the application of pure grade material, requirements for insoluble matter, chlorides, sulphates, bromates and iron have been modified. The requirement of calcium, magnesium and ammonium hydroxides precipitate has been substituted by alkaline earths for both the grades

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for sodium chlorate.

---

*Rules for rounding off numerical values (*revised*).

2. GRADES

2.1 The material shall have the following two grades:

a) Pure, and

b) Technical.

3. REQUIREMENTS

3.1 Description — Pure grade material shall be colourless, odourless crystals or granules or powder. Technical grade material shall be pale yellow to white, odourless crystals or granules or powder.

NOTE — The pale yellow colour of the material is due to traces of chromate present. Such small amounts of chromate do not interfere with the commercial application of the material.

3.2 The material shall also conform to the requirements specified in Table 1, when tested in accordance with the methods prescribed in Appendix A.

TABLE 1 REQUIREMENTS FOR SODIUM CHLORATE

SL No.	CHARACTERISTIC	REQUIREMENT		METHOD OF TEST (REF TO CL. NO. IN APPENDIX A)
		Pure	Technical	
(1)	(2)	(3)	(4)	(5)
i)	Sodium chlorate (as $NaClO_2$) percent by mass, *Min*	99 0	98 0	A-2
ii)	Insoluble matter, percent by mass, *Max*	0.05	0.2	A-3
iii)	Chlorides (as Cl), percent by mass, *Max*	0.05	0.5	A-4
iv)	Sulphates (as SO_4), percent by mass, *Max*	0 02	0.2	A-5
v)	Bromates (as BrO_3), percent by mass, *Max*	0.05	0.2	A-6
vi)	Heavy metals (as Pb), percent by mass, *Max*	0.001	0.003	A-7
vii)	Iron (as Fe), percent by mass, *Max*	0.005	0.02	A-8
viii)	Nitrogen compounds (as N), percent by mass, *Max*	0.001	—	A-9
ix)	Alkaline earths, percent by mass, *Max*	0.05	0.02	A-10
x)	Arsenic (as As_2O_2), percent by mass, *Max*	0.000 2	—	A-11

4. PACKING AND MARKING

4.1 Packing — The material shall be packed in bottles, plastic-lined cartons, plastic-lined drums or epoxy coated mild steel drums and subject to the relevant provision of Red Tariff No. 18 of 1960 issued by the Indian Railways Conference Association with any alterations or additions made thereafter.

4.1.1 Necessary safeguards shall be provided against risk of dangerous explosions which might occur when the material is heated or subjected to concussion or triturated with organic substances, charocal, sulphur, sulphides, powdered metallic iron or other oxidizable substances and precautions shall be taken at all times to prevent accident by explosions

4.2 Marking -Each container shall bear legibly and indelibly the following information:

a) Name and grade of the material,
b) Name of the manufacturer and/or his recognized trade-mark, if any;
c) Net mass of the contents;
d) Date of manufacture, and
e) Batch number.

4.2.1 The containers may also be marked with the Standard Mark;

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to compay with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions, under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

5. SAMPLING

5.1 Representative samples of the material shall be drawn and judged for conformity to the requirements of this specification in accordance with the procedures prescribed in Appendix B.

APPENDIX A

METHODS OF TEST FOR SODIUM CHLORATE

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be used in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis

A-2. SODIUM CHLORATE

A-2.0 Outline of the Method — This is determined by estimating the amount of standard potassium permanganate consumed by the material after reduction.

A-2.1 Reagents

A-2.1.1 *Ferrous Sulphate or Ferrous Ammonium Sulphate Solution* — approximately 0.1 N.

A-2.1.2 *Standard Potassium Permanganate Solution* — 0.1 N.

A-2.1.3 *Manganous Sulphate Solution* — Dissolve 10 g of the material in water and dilute to 100 ml

A-2.1.4 *Dilute Sulphuric Acid* — approximately 2 N.

A-2.2 Procedure — Dry the material over sulphuric acid for 24 hours. Weigh accurately about 0 10 g and dissolve it in 20 ml of water in a 250-ml conical flask Add exactly 35 ml of ferrous sulphate (or ferrous ammonium sulphate) solution and about 10 ml of dilute sulphuric acid, close the flask with a valve stopper to prevent access of air and boil for 15 minutes. Cool the contents of the flask, add 10 ml of manganous sulphate solution and titrate the excess of ferrous sulphate against standard potassium permanganate. Run a blank in the same manner with 35 ml of the ferrous sulphate (or ferrous ammonium sulphate) solution and about 10 ml of dilute sulphuric acid. The difference between the volume of potassium permanganate consumed in the blank and the sample represents the sodium chlorate content.

A-2.3 Calculation

$$\text{Sodium chlorate, percent by mass} = \frac{1\ 774 \times (V_2 - V_1) \times N}{M}$$

---

*Specification for water for general laboratory use *(second revision)* where

V_1 = volume in ml of permanganate solution consumed by excess of reducing agent,

V_2 = volume in ml of permanganate solution consumed in the blank experiment,

N = normality of permanganate solution, and

M = mass in g of the material taken for the test.

A-3. INSOLUBLE MATTER

A-3.0 Outline of the Method — Sample is dissolved in water and insoluble matter is separated by filtration, dried and weighed.

A-3.1 Procedure — Dissolve 25 g of the sample in 200 ml of water, heat to boiling and digest in a covered beaker on the steam-bath for 1 hour. Filter through a tared (Gooch or sintered glass G. No. 4) crucible, wash thoroughly, dry at 105°C ± 2°C and weigh.

A-3.2 Calculation

$$\text{Insoluble matter, percent by mass} = \frac{100\,m}{M}$$

where

m = mass in g of the residue, and

M = mass in g of the material taken for the test.

A-4. CHLORIDES

A-4.0 Outline of the Method — Excess silver nitrate in nitric acid solution produces a white suspension of silver chloride on addition to a solution containing chloride ion.

A-4.1 Apparatus

A-4.1.1 *Nessler Cylinders* — 50 ml capacity.

A-4-2 Reagents

A-4.2.1 *Concentrated Nitric Acid* — *See* IS : 264-1976*.

A-4.2.2 *Silver Nitrate Solution* — approximately 4 percent (*m/v*).

A-4.2.3 *Standard Chloride Solution* — Dissolve 1.649 g of sodium chloride dried at 105 ± 5°C in water and dilute to 1 000 ml. Dilute 10 ml of this solution to 100 ml. One millilitre of this solution contains 0.1 mg of chloride (as Cl).

---

*Specification for nitric acid (*second revision*).

A-4.3 Procedure — Dissolve 1.00 g of pure grade material in 30 ml of water, add 5 drops of concentrated nitric acid and 1 ml of silver nitrate. Make up the volume to 50 ml mark with water. In case of technical grade material, dissolve 1 00 g of the material in water and dilute to 100 ml. To 1 ml of this diluted solution, add 5 drops of concentrated nitric acid and 1 ml of silver nitrate. Make up the volume to 50-ml mark with water. Carry out control tests using 5 ml of standard chloride solution and the same quantities of other reagents in the same total volume of the reaction mixture. Compare the turbidity after 5 minutes.

A-4.3.1 The limits prescribed in Table I shall be taken as not having been exceeded if the turbidity produced in the test with the material is not greater than that produced in the control test.

A-5. SULPHATES

A-5.0 Outline of the Method — A solution of the material is tested with barium chloride for appearance of turbidity.

A-5.1 Apparatus

A-5.1.1 *Nessler Cylinders* — 50 ml capacity.

A-5.2 Reagents

A-5.2.1 *Dilute Hydrochloric Acid* — 1 N.

A-5.2.2 *Barium Chloride Solution* — approximately 10 percent *(m/v*).

A-5.2.3 *Standard Sulphate Solution* — Dissolve 0.148 g of ignited sodium sulphate (Na_2SO_4) in water and dilute to 100 ml of this solution with water to 1 000 ml. One millilitre of this solution contains 0.1 mg of sulphate (as SO_4).

A-5.3 Procedure — Dissolve 1.0 g of pure grade material in 20 ml of water, add 5 ml of dilute hydrochloric acid and 2 ml of barium chloride solution. Transfer to a Nessler cylinder and dilute to mark. In the case of technical grade material, dissolve 1 g of the material in water and dilute to 100 ml. To 10 ml of the diluted solution, add 5 ml of dilute hydrochloric acid and 2 ml of barium chloride solution. Transfer to a Nessler cylinder and dilute to mark Carry out a control test in another Nessler cylinder using 2 ml of standard sulphate solution in place of the material and the same quantities of other reagents in the same total volume of the reaction mixture.

A-5.3.1 The limits prescribed in Table 1 shall be taken as not having been exceeded if the turbidity produced in the test with the material is not greater than that produced in the control test.

A-6. BROMATES

A-6.0 Outline of the Method — Iodine is liberated by the action of potassium iodide and bromate, which is then titrated against standard thiosulphate solution.

A-6.1 Reagents

A-6.1.1 *Dilute Hydrochloric Acid* — approximately 1 N.

A-6.1.2 *Potassium Iodide Solution* — approximately 10 percent (*m/v*).

A-6.1.3 *Standard Sodium Thiosulphate Solution* — 0.1 N freshly prepared.

A-6.1.4 *Starch Solution* — Triturate 5 g of pure starch and 0.01 g of mercuric iodide with 30 ml of water in a mortar. Pour the resulting paste into one litre of boiling water, boil for 3 minutes, allow the solution to cool and decant off the clear liquid. The solution used for the test shall be freshly prepared.

A-6.1.5 *Sodium Chlorate* — bromate free

A-6.2 Procedure — Weigh accurately about 2 00 g of material into a thoroughly cleaned iodine flask and dissolve in about 100 ml of freshly boiled and cooled water. Add 10 ml of 1 N hydrochloric acid, mix and add 10 ml of fresh potassium iodide solution Stopper immediately and allow to stand in the dark for 45 minutes At the end of this period, add 5 ml of starch solution and tirate the liberated iodine with freshly prepared standard thiosulphate solution.

A-6.2.1 Carry out a blank determination using sodium chlorate (bromate-free) and other reagents used in the test under **A-6.2.**

A-6.3 Calculation

$$\text{Bromate (as BrO}_3\text{), percent by mass} = \frac{2{\cdot}13\,(V_1 - V_2)\,N}{M}$$

where

V_1 = volume in ml of standard thiosulphate solution required for the test with the material,

V_2 = volume in ml of standard thiosulphate solution required for blank determination,

N = normality of standard thiosulphate solution, and

M = mass in g of the material taken for the test.

A-7. HEAVY METALS

A-7.0 Outline of the Method — Heavy metal is determined colorimetrically in Nessler Cylinders using saturated hydrogen sulphide solution against that produced by standard lead solution

A-7.1 Apparatus

A-7.1.1 *Nessler Cylinders* — 50 ml capacity.

A-7.2 Reagents

A-7.2.1 p-*Nitrophenol Indicator Solution* — Dissolve 0.2 g ρ-nitrophenol in hot water and dilute to 100 ml.

A-7.2.2 *Dilute Ammonium Hydroxide* — 1 : 9 (*v/v*).

A-7.2.3 *Dilute Hydrochloric Acid* — approximately 0 1 N.

A-7.2.4 *Hydrogen Sulphide Solution* — saturated and freshly prepared.

A-7.2.5 *Standard Lead Solution* — Dissolve 1.60 g of lead nitrate in water and dilute to 1 000 ml Dilute 10 ml of the solution to 1 000 ml. One millilitre of this solution contains 0 01 mg of lead (as Pb).

A-7.3 Procedure — Dissolve 2.00 g of the material in 25 ml of water in a Nessler cylinder and add one drop of ρ-nitrophenol indicator solution. Add dropwise dilute ammonium hydroxide until the solution turns yellow. Add dilute hydrochloric acid dropwise until the soluiion becomes colourless and then add 0 5 ml of the acid in excess. Add 5 ml of hydrogen sulphide solution, dilute to the mark and mix well. Carry out a control test in a similar manner in another Nessler cylinder using 2 ml of standard lead solution for pure grade and 6 ml for technical grade.

A-7.3.1 The relevant limit prescribed in Table 1 shall be taken as not having been exceeded if the intensity of colour produced with the material is not greater than that produced in the control tests.

A-6. IRON

A-8.0 Outline of the Method — Iron is determined colorimetrically by visual comparison using butanolic potassium thiocyanate solution.

A-8.1 Apparatus

A-8.1.1 *Nessler Cylinders* — 50 ml capacity.

A-8.2 Reagents

A-8.2.1 *Concentrated Hydrochloric Acid* - *See* IS . 265-1976*

---

*Specification for the hydrochloric acid (*second revision*).

A-8.2.2 *Ammonium Persulphate*

A-8.2.3 *Butanolic Potassium Thiocyanate Solution* — Dissolve 10 g of potassium thiocyanate in 10 ml of water. Add sufficient *n*-butanol to make up to 100 ml and shake vigorously until the solution is clear

A-8.2.4 *Standard Iron Solution* — Dissolve 0 702 g of ammonium ferrous sulphate [(NH_4)$_2$ SO_4 $FeSO_4$ $6H_2O$] in water containing 10 ml of dilute sulphuric acid and dilute with water to 100 ml Dilute 10 ml of the solution to 100 ml. One millilitre of the dilute solution contains 0.1 mg of iron (as Fe).

A-8.3 Procedure — Dissolve 2 00 g of pure grade material in 10 ml of water and 10 ml of hydrochloric acid and evaporate to dryness on a steam bath. Add 5 ml of hydrochloric acid and again evaporate to drynrss In the case of technical grade material, dissolve 2 00 g of the material in water and dilute to 100 ml. To 10 ml of the diluted solution, add 10 ml of hydrochloric acid and evaporate to dryness on a steam bath Add 5 ml of hydrochloric acid and again evaporate to dryness Prepare control tests by adding 1 ml for pure grade and 0 4 ml for technical grade of standard iron solution, 15 ml of hydrochloric acid and evaporate it on the steam bath to dryness. Take up each in 2 ml of hydrochloric acid, add about 30 mg of ammonium persulphate, 15 ml of butanolic potassium thiocyanate solution and shake vigorously for 30 seconds and allow to separate.

A-8.3.1 The limit prescribed in Table 1 shall be taken as not having been exceeded if the intensity of the red colour produced in the test with the material is not greater than that produced in the control tests

A-9. NITROGEN COMPOUNDS

A-9.0 Outline of the Method — The distillate of the material is tested for the intensity of colour with Nessler solution against that produced by standard nitrogen solution.

A-9.1 Apparatus

A-9.1.1 *Nessler Cylinders* — 50 ml capacity

A-9.2 Reagents

A-9.2.1 *Sodium Hydroxide Solution* — 10 percent.

A-9.2.2 *Devarda's Alloy* — containing 45 parts aluminium, 50 parts copper and 5 parts zinc.

A-9.2.3 *Nessler Solution* — Dissolve 10 g of potassium iodide in 10 ml of ammonia-free water, and add to it slowly while stirring, saturated mercuric chloride solution until a slight permanent precipitate is formed. Add 30 g of potassium hydroxide and, when it has dissolved, add 1 ml more of mercuric chloride solution and dilute to 200 ml with ammonia-free water. Allow to settle overnight, decant the clear solution and keep it in a bottle closed with a well-fitting rubber stopper.

A-9.2.4 *Standard Nitrogen Solution* — Dissolve 0.381 9 g of ammonium chloride in enough water to make up the volume to 1 000 ml. Dilute 10 ml of this solution with water to 100 ml. One millilitre of the diluted solution contains 0.01 mg or nitrogen (as N).

A-9.3 Procedure — Dissolve 1.00 g of the material in 40 ml of water. Add 1 g of powdered Devarda's alloy and 10 ml of 10 percent sodium hydroxide. Allow to stand for 2 hours protected from loss or access to ammonia, then distil 40 ml, collecting the distillate in 5 ml of water containing 1 drop of dilute hydrochloric acid. Transfer the distillate to a Nessler cylinder, and 1 ml of 10 percent sodium hydroxide and 2 ml of Nessler solution. Carry out control tests in exactly the same manner using 1 ml of nitrogen solution for pure grade.

A-9.3.1 The limit prescribed in Table 1 shall be taken as not having been exceeded if the intensity of colour produced in the test with the material is not greater than that produced in the control tests.

A-10 ALKALINE EARTHS

A-10.0 Outline of the Method — After dissolving the material, alkaline earths are precipitated with a mixture of ammonium oxalate, phosphate and hydroxide, which is then determined by ignition and weighing.

A-10.1 Reagents

A-10.1.1 *Hydrochloric Acid — see* IS : 265-1976*.

A-10.1.2 *Ammonium Oxalate Solution in Water* — 15 percent.

A-10.1.3 *Ammonium Phosphate* [$(NH_4)_2HPO_4$] *Solution in Water* — 15 percent.

A.10.1.4 *Ammonium Hydroxide* — approximately 2 N.

A-10.2 Procedure — Weigh accurately about 10 g of the material and boil with a mixture of 50 ml of water and 15 ml of hydrochloric acid until no more chlorine is evolved Dilute to about 120 ml, heat to boiling, add 5 ml of ammonium oxalate, 3 ml of ammonium phosphate and 20 ml of ammonium hydroxide and allow to stand overnight. If a precipitate is present, filter and wash with ammounium hydroxide and ignite.

---

*Specification for hydrochloric acid (*second revision*).

A-10.2.1 The limits prescribed shall be taken as not having been exceeded if the mass of the ignited precipitate does not exceed 0 005 g for pure grade and 0.002 g for technical grade.

A-11. ARSENIC

A-11.0 Outline of the Method — The stain produced on mercuric chloride paper is matched against that obtained with a series of standard arsenic solutions.

A-11.1 Dissolve 1.00 g of the material in 10 ml of water and carry out the test for arsenic as prescribed in IS . 2088-1983* using 0 002 mg of arsenic trioxide (As_2O_3) for preparing the comparison stain.

APPENDIX B

(*Clause* 5.1)

SAMPLING OF SODIUM CHLORATE

B-1. SCALE OF SAMPLING

B-1.1 Lot — In any consignment, all the containers of the same size and grade drawn from the same batch of manufacture, shall be grouped together to constitute a lot.

B-1.2 For ascertaining the conformity of the material in the lot to the requirements of this specification, tests shall be carried out for each lot separately. The number of containers to be selected for this purpose shall depend on the size of the lot and shall be in accordance with Table 2.

TABLE 2 NUMBER OF CONTAINERS TO BE SELECTED FOR SAMPLING

NUMBER OF CONTAINERS IN THE LOT *N* (1)	NUMBFR OF CONTAINERS TO BE SELECTED *n* (2)
Up to 25	2
26 to 50	3
51 to 100	4
101 to 300	5
301 and above	6

---

*Method for determination of arsenic (*second revision*).

B-1.3 These containers shall be selected at random (*see* IS : 4905-1968*) from the lot To ensure randomness of selection, a random number table may be used In case such a table is not available, the following procedure may be adopted:

> Starting from any container in the lot, count them as 1, 2, 3..... etc, up to *r* and so on, in one order. Every *r*th container thus counted shall be withdrawn to constitute the sample, where *r* is the integral part of *N/n* (*N* being the number of containers in the lot and *n* being the number of containers to be selected).

B-2. PREPARATION OF SAMPLES

B-2.1 Draw with an appropriate sampling instrument small portions of the material from different parts of each selected container. The total quantity of the material to be drawn from each container shall be not less than 150 g.

B-2.2 The material drawn from all the containers selected according to **B-2.1** shall be thoroughly mixed together to constitute a single mass. The total material so obtained shall be divided into three approximately equal parts, each of which shall be called a composite sample representing the lot

B-2.3 Each of the three composite samples obtained in **B-2.2** shall be immediately transferred to appropriate sample containers which shall be sealed air-tight immediately alter filling and marked with necessary details for identification.

B-2.4 One of three composite samples shall be marked for the purchaser, another for the supplier and the third kept as a referee sample.

B-2.5 To referee sample shall be kept at a place and under conditions agreed to between the purchaser and the supplier. The referee sample shall be used in the case of dispute.

B-3. NUMBER OF TESTS AND CRITERION FOR CONFORMITY

B-3.1 Tests for all the requirements of this specification shall be conducted on the composite sample.

B-3.2 The lot shall be declared as conforming to the requirements of the specification if the composite sample satisfies all the tests in **B-3.1.**

---

*Methods for random sampling.

(*Continued from page* 2)

Members	*Representing*
SHRI L N CHOWDHARY	Indian Paper Mills Association, Calcutta
SHRI M V. DESAI	Atul Products Ltd, Atul
DR J. M. TUREL (*Alternate)*	
SHRI V K. M. MENON	Alkali Manufacturers Association of India, Bombay
SHRI H. K DEDHIA (*Alternate)*	
DR A. N. MISRA	Gujarat Alkalies & Chemicals Ltd, Vadodara
SHHI N. K. SACHAR (*Alternate*)	
SHRI M. P. MISTRY	Excel Industries Ltd, Bombay
SHRI D B MEHTA (*Alternate*)	
SHRI D. N V RAO	Tata Chemicals Ltd, Bombay
SHRI C. NEELKANTHAN (*Alternate)*	
SHRI V. D. SHARMA	Shriram Foods & Fertiliser Industries, New Delhi
SHRI P. K BANERJEE (*Alternate*)	
SHRI M. R. SOMAYAJI	Mettur Chemical & Industrial Corporation Ltd, Mettur Dam
SHRI K. D. RAMACHANDRAN (*Alternate*)	
SHRI K S. TANDON	Kanona Chemicals & Industries Ltd, Calcutta
SHRI P K. BANERJEE (*Alternate)*	
SHRI S. C. UPPALADINNI	United Phosphorus Ltd, Bombay
SHRI N J. PATEL (*Alternate)*	

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s(s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

BUREAU OP INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002
Telephones: 3 31 01 31, 3 31 13 75 Telegrams: Manaksanstha
(Common to all Offices)

Regional Offices:		*Telephone*
*Western	Manakalaya, E9 M DC, Marol, Andheri East), BOMBAY 400093	6 32 92 85
†Eastern	1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola, CALCUTTA 700054	36 24 99
Northern	SCO 445-446, Sector 35-C, CHANDIGARH 160036	2 18 43 3 16 41
Southern	C. I. T. Campus, MADRAS 600113	41 24 12 41 25 19 41 29 16

Branch Offices:	
'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	2 63 48 2 63 49
'F' Block, Unity Bldg, Narasimharaja Square, BANGALORE 560002	22 48 05
Gangotri Complex, 5th Floor, Bhadbhada Road, T T. Nagar, BHOPAL 462003	6 67 16
Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002	5 36 27
53/5, Ward No. 29, R. G. Barua Road, 5th Byelane GUWAHATI 781003	–
5-8-56C L. N. Gupta Marg (Nampally Station Road), HYDERABAD 500001	23 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	6 34 71 6 98 32
117/418 B Sarvodaya Nagar, KANPUR 208005	21 63 76 21 82 92
Patliputra Industrial Estate, PATNA 800013	6 23 05
Hantex Bldg (2nd Floor), Railway Station Road, TRIVANDRUM 695001	7 66 37

Inspection Offices (With Sale Point):	
Pushpanjali, 205A West High Court Road, Bharampeth Extension, NAGPUR 440010	2 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

---

*Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 89 65 29

†Sales Office in Calcutta is at 5 Chowringhee Approach, P O Princep Street, Calcutta 700072 27 68 00

Printed at New India Printing Press, Khurja, India